

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS—MILTON WHITNEY, Chief.
IN COOPERATION WITH THE UNIVERSITY OF IDAHO AGRICULTURAL
EXPERIMENT STATION, J. S. JONES, DIRECTOR.

SOIL SURVEY OF LATAH COUNTY, IDAHO.

BY

J. H. AGEE, OF THE U. S. DEPARTMENT OF AGRICULTURE,
IN CHARGE, AND GEORGE W. GRAVES AND C. B.
MICKELWAITE, OF THE UNIVERSITY OF IDAHO.

MACY H. LAPHAM, INSPECTOR, WESTERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1915.]



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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,

Washington, D. C., June 7, 1916.

SIR: Under the cooperative agreement with the University of Idaho Agricultural Experiment Station a soil survey of Latah County was carried to completion during the field season of 1915.

I have the honor to transmit herewith the manuscript and map covering this work and to recommend their publication as advance sheets of Field Operations of the Bureau of Soils for 1915, as authorized by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

Hon. D. F. HOUSTON,
Secretary of Agriculture.

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MAP.

Soil map, Latah County sheet, Idaho.

SOIL SURVEY OF LATAH COUNTY, IDAHO.

By J. H. AGEE, of the U. S. Department of Agriculture, in charge, and GEORGE W. GRAVES and C. B. MICKELWAITE, of the University of Idaho Agricultural Experiment Station.—Area inspected by MACY H. LAPLHAM.

DESCRIPTION OF THE AREA.

Latah County, Idaho, is situated in the west-central part of the northern extension of the State, commonly known as the "Panhandle." It is bounded on the north by Benewah County, on the east by Shoshone and Clearwater Counties, and on the south by Nez Perce and Clearwater Counties. Whitman and Spokane Counties, Wash., border it on the west. The area covered by the survey contains 910 square miles, or 582,400 acres, and comprises all of the county except that part (175 square miles) lying within the St. Joe National Forest.

The extreme eastern and northern parts of Latah County are mountainous. Most of the western and southern parts consist of rolling prairie, part of the so-called Palouse region. Out of this plateau, having a general altitude above sea level of 2,000 to 3,000 feet, several elevations rise to an altitude of 3,500 to 5,000 feet. A few of these appear as isolated knobs; others consist of ridges, the larger of these being extensions of the Coeur d'Alene and Clearwater Mountains.

The Thatuna Range, the most prominent of the ridges rising in the prairie country, extends northeasterly from the western boundary of the county, at a point about 6 miles north of Moscow, and connects with the Coeur d'Alene Mountain system. Ball Butte and Tomer Butte are examples of the isolated knobs. They are much lower than the Thatuna Range. Potato Hill, an elevation just north of Deary, is another of these. It rises about 1,000 feet above the town.

In order to understand the physiography of the country it is well to consider in part the geologic changes that have affected the present topographic features. The original topography was that of a denuded land surface in which granites, quartzites, and schists had been exposed by erosion, and formed sharp-crested ridges and isolated

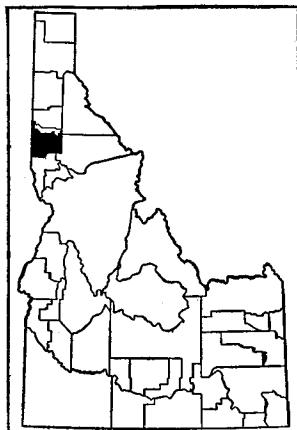


FIG. 1.—Sketch map showing location of the Latah County area, Idaho.

buttes. At a later period much of the land surface was covered by a flow of lava which gradually filled all the stream valleys and lowlands, leaving only the higher buttes and ranges unmantled. This flow is known geologically as the Columbia River lava. It covers a large area east of the Cascade Range, extending to the Clearwater and Bitterroot Mountains. In places its thickness is more than 4,000 feet. Some of the streams have cut steep-walled canyons through the basalt to a depth of 1,500 feet below the general elevation of the uplands. The southern part of the county is dissected by canyons of this character (See Pl. I, fig. 1).

After the lava flow the topography consisted of a table-land of basalt, out of which the granite, quartzite, and schist buttes rose to altitudes ranging from a few hundred feet to as much as 3,000 feet.

Later deposits of very fine material, carried by the wind, covered the basalt and the lower lying granite hills with a mantle 5 to 60 feet in thickness. This material was spread over the whole area, except on the high ridges, and erosion working upon this soft material has produced a succession of rounded hills, with well-defined drainage valleys intervening, above which the granite ridges stand in relief. This eolian material has also affected the outline of the mountains and buttes, giving them a smoother profile than is usually found in regions where igneous material has weathered in place.

Drainage is well established over the entire county. In the eastern part the streams are swift and flow through deep canyons. The drainage of this part of the county is through Potlatch River and its tributaries. From Bovill to Juliaetta this river has a fall of 1,600 feet. In the western part of the county the streams have a more gentle flow and are bordered in places by flats and bottom lands. The principal drainage system of this part of the county is the Palouse River.

According to the 1910 census, the population of the county is 18,818. The rural population, comprising 80.5 per cent of the total, averages 13.4 persons to the square mile. The population is 84.3 per cent of native birth. Of the foreign-born population, Scandinavian, German, and Canadian nationalities predominate. The native Americans are principally from the Middle West. In the Troy, Deary, Linden, and Park communities the population is almost entirely of Scandinavian descent. In and about Genesee most of the people are of German descent. The eastern and northern parts of the county are sparsely settled.

Moscow, the county seat, is situated in the extreme western part of Latah County. The University of Idaho and the State Agricultural College and Experiment Station are located here. The principal industrial works are a packing plant and two plants for the manufacture of harvesting machines. The population of Moscow is about 4,000.

Potlatch is situated on the Palouse River, 7 miles east of the western boundary of the county. It has a population of about 1,000. One of the largest lumber mills in the United States is located here. Genesee, the third largest town, with a population of about 800, is situated on the southern boundary of the county about 5 miles east of the western State line. It is the center of a well-developed live-stock section. Troy has a population of about 500. A fire-brick factory is in operation here.

Deary, Bovill, Kendrick, and Juliaetta are trading centers for their immediate communities. Kendrick and Juliaetta are shipping points for the truck-growing section of the county.

The settled districts of Latah County are well supplied with public roads. Most of them are kept in repair, but practically none are of permanent construction. During late fall and early spring they are almost impassable. Only a few miles of macadam road have been constructed.

Most of the county is supplied with railroad facilities. The Northern Pacific has one branch line extending to Genesee and another crossing the county from Moscow east and southeast to Troy and Kendrick, thence southwest to Juliaetta and Lewiston. The Washington, Idaho & Montana Railway begins at Palouse, in Washington, and crosses the county through Potlatch, Harvard, and Deary, terminating at Bovill. A branch line of the Chicago, Milwaukee & St. Paul Railway runs from St. Maries in Benewah County, through Bovill to Elk River in Clearwater County. The Inland Empire Railroad, an electric line, traverses the western part of the county for a short distance. It connects Spokane and Moscow. The Oregon-Washington Railroad & Navigation Co. has a branch line extending from Colfax, Wash., to Moscow.

Latah County is a prosperous agricultural region. Most of the farms are in good condition, and the farmhouses and buildings are well kept (see Pl. I, fig. 2). Rural delivery of mail reaches all the settled parts of the county.

The lumber industry employs hundreds of persons and adds to the general prosperity of the county. Copper mining was carried on for several years, but there are no companies operating at the present time. A mica (muscovite) mine is in operation about 9 miles north of Deary.

There are large warehouses for storing grain at Moscow, Genesee, and other points in the county. Much of the wheat is shipped through Portland and Seattle to Asiatic countries.

CLIMATE.

The summers in Latah County as a rule are dry and pleasant. Temperatures are not oppressive during the day and the nights are usually cool. The falls are usually marked by a rainy period begin-

ning about the middle of September and lasting for about two weeks. Following this there is a period of cool, frosty weather, which often lasts until the 1st of December. Snow lies on the ground in mid-winter for a period ranging from 2 to 6 weeks. The springs are usually late and sometimes rainy.

Most of the precipitation comes during the winter months, there being very little rainfall in June, July, August, and the first half of September. This distribution is extremely favorable for grain harvesting and hay making. The rainfall is sufficient for all the common crops, and it is reported that a crop failure from drought has not occurred since the first settlement.

Very few windstorms occur, but there are occasional dust storms in the summer. Cyclones are unknown and electric storms are very rare.

The average date of the first killing frost in the fall is October 10, and that of the last in the spring May 8. This gives an average growing season of 155 days, which is ample for the maturing of most of the general-farm crops grown. Seeding of wheat usually takes place from September 20 until October 15. Wheat harvest begins the latter half of July, and is usually over by August 15. The growing season on the ridge extending toward Kendrick and Juliaetta is longer than that for the county as a whole, and permits the growing of such crops as corn and field beans.

The statistics given in the table below are compiled from the Weather Bureau records kept at Moscow and are applicable to the greater part of the western half of the county. A somewhat heavier precipitation is believed to occur in the eastern and northern parts of the county.

Normal monthly, seasonal, and annual temperature and precipitation at Moscow.

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.
December.....	°F. 32.2	°F. 60	°F. - 1	Inches. 2.69	Inches. 1.25	Inches. 3.73
January.....	29.2	53	-16	2.60	1.22	2.29
February.....	32.0	59	-17	2.02	1.50	3.49
Winter.....	31.1	60	-17	7.31	3.97	9.51
March.....	37.0	68	- 2	2.08	2.77	1.18
April.....	46.2	86	22	1.45	1.21	1.21
May.....	52.8	92	27	2.52	0.73	3.28
Spring.....	45.3	92	- 2	6.05	4.71	5.67

Normal monthly, seasonal, and annual temperature and precipitation at Moscow—Contd.

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.
June.....	°F. 58.4	°F. 98	°F. 32	Inches. 1.52	Inches. 2.74	Inches. 0.59
July.....	66.8	103	34	0.68	1.30	2.33
August.....	65.6	100	30	0.84	0.11	0.27
Summer.....	63.6	103	30	3.04	4.15	3.19
September.....	57.1	95	27	1.33	0.38	1.29
October.....	48.8	82	11	1.62	1.49	1.24
November.....	37.6	67	-14	3.16	0.75	6.59
Fall.....	47.8	95	-14	6.11	2.62	9.12
Year.....	47.0	103	-17	22.51	15.45	27.49

AGRICULTURE.

The history of agriculture in Latah County is that of the "Palouse Country" in general. Stock raising was the earliest established agricultural interest. Stockmen from Oregon and Washington found good grazing on the bunch grass of the hilly prairie section of the county and before the early seventies it had been closely grazed over. The cattle were driven to points on the Snake River and shipped to Portland and cities on the Pacific coast.

The first permanent settlement was made in the vicinity of Moscow, about 1872. After this, settlers from Oregon and Washington, originally from the Middle West, took up homesteads. In a short time all the prairie country was settled and settlers began to take up the land having a scattering growth of yellow pine. Most of this less densely forested land has been cleared and put under cultivation, and the unsettled part of the county consists either of the cut-over land or that which is still densely timbered. Much of the forest land is held by large lumber companies operating near their holdings. Figure 2 shows the forested areas of the county.

The rapid settlement of the region is due principally to its being so well adapted to wheat growing. The earliest settlers found wheat to be a very profitable crop and it has been grown from the beginning. For several years much of the grain was used locally, or in the nearby surrounding country, but increased production made it necessary to find large markets. Most of the wheat sold was hauled by wagon to the Snake River and shipped by way of this stream and the

Columbia River to Portland and various points on the Pacific coast. In 1887 the Northern Pacific Railway built a line to Genesee, which gave improved shipping facilities, eliminating the long hauls previously necessary. The increase in profits naturally stimulated production.

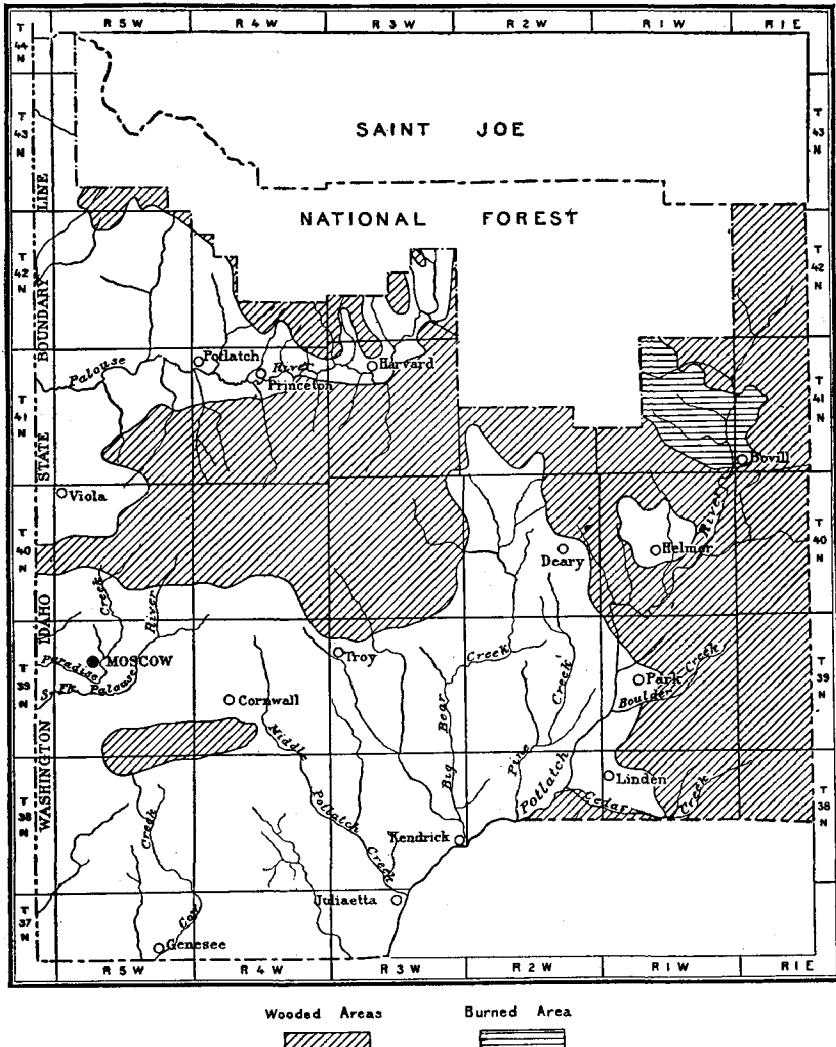


FIG. 2.—Sketch map of Latah County, Idaho, showing forested areas.

The growing of oats for hay on all the upland soils and the cutting of timothy and wild-grass hay on the bottom lands have been carried on since the earliest settlement of the county. Considerable hay was baled and shipped prior to 1890.

Wheat is the principal crop grown in Latah County. The census of 1890 shows 24,370 acres in wheat, with a production of 494,166

bushels. In 1899 there were 63,770 acres of wheat, which produced 1,584,450 bushels, and the census of 1910 shows 47,300 acres in wheat, producing 1,681,200 bushels. Wheat is grown on practically every farm, with yields varying from 15 to 50 bushels per acre.

The leading varieties of wheat grown are the Red Russian, Forty-fold, Little Club, and Palouse Bluestem. The first-named predominates and the others are stated in the order of their relative importance. A number of other kinds of wheat are grown, but their combined acreage does not exceed that of any one of the four leading varieties. Farmers generally do not like to handle the bearded wheats; consequently they are not grown to any great extent.

Winter wheat is grown almost exclusively. That little spring wheat is grown is due chiefly to the poorer yielding qualities of spring varieties. The seeding is usually done in the latter part of September and the first two weeks in October. It is quite necessary that the seeding be completed by the middle of October, before the ground becomes too wet and before it is too late for proper germination. All the wheat grown is seeded with the drill.

Oats are grown both as a hay crop and for the grain. The census of 1890 shows 2,715 acres in oats, which produced 85,971 bushels, and the 1900 census reports 10,030 acres, producing 349,361 bushels. For 1909 the census reports 41,181 acres in oats, from which 1,727,967 bushels were harvested. When oats are grown for hay they are usually cut when the kernel is still in the dough stage. Some of the farmers cut oats with a mower and others cut the crop with the binder and handle the hay crop in bundles. Oats make a good quality of hay when properly cured.

Barley is grown by many of the farmers. The yields are quite satisfactory. The census shows 4,029 acres in this crop in 1909, producing 138,727 bushels. Barley is grown more extensively in the Genesee district than in other sections of the county.

Corn has not generally proved a paying crop in Latah County when grown for grain, because of the shortness of the growing season. On the bench lands and the ridges approaching the Potlatch River canyon very satisfactory yields of grain have been obtained. At the experiment station at Moscow corn is grown as a forage crop and used as silage. Yields of 7 or 8 tons per acre are usually obtained.

The 1890 census shows 15,920 acres cut for hay, with a production of 21,767 tons. This included grains cut green and wild and tame grasses. The 1910 census reports 20,365 acres in grain (cut green for hay, principally oats), producing 28,788 tons, and 7,060 acres of tame grasses, producing 9,238 tons. The 1910 census shows 15,881 acres of grain cut green for hay, with a production of 26,098 tons,

and 22,390 acres in tame grasses, producing 25,083 tons. Timothy is the leading hay grass. It is usually sown alone, but some of the farmers sow a mixture of timothy and red clover or timothy and alsike clover. The latter combination has not been tried long enough to warrant a definite conclusion as to its desirability as a hay crop. Alfalfa is grown to some extent, but the yields of hay are not entirely satisfactory.

Beans are grown successfully on the ridge lands north of Juliaetta and Kendrick. The crop is cultivated in about the same manner and is given about the same number of workings as corn. Planting is done usually during the month of May and the crop is harvested the latter part of August or the first part of September. There are 7 or 8 commercial varieties of beans grown, the Little Navy being the most popular. A yield of about 700 to 800 pounds per acre is obtained. The crop is sold in the East and Middle West.

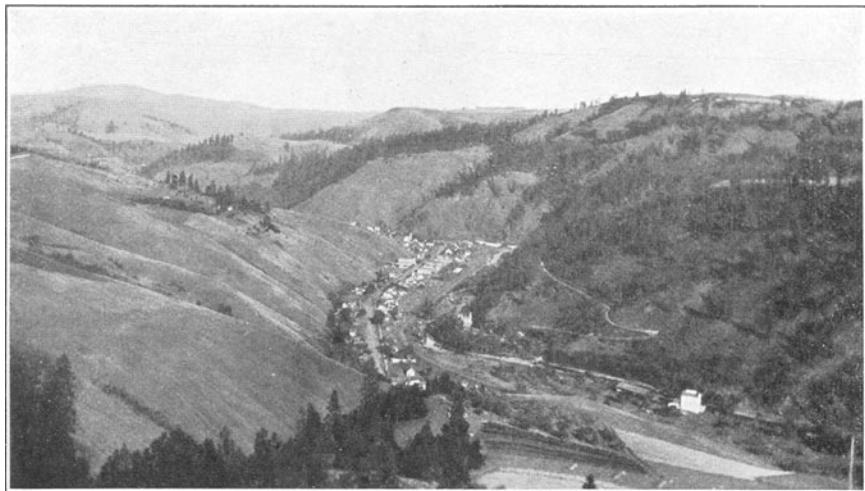
Hardy tree fruits, berries, and vegetables are grown by nearly every farmer for home use. There are a few commercial prune and cherry orchards. Many varieties of vegetables are grown extensively in the vicinity of Juliaetta. Cabbage, tomatoes, cantaloupes, beans, and peas are some of the trucking crops. These are grown to supply the early market.

Stock raising is not well established in Latah County. Most of the farmers raise a few hogs for the market each year. The Duroc Jersey and Poland China are the favorite breeds. In the Genesee section of the county some of the farmers raise cattle and horses of good quality. About the time wheat production became well established horses of the Belgian, Clydesdale, Percheron, and Shire breeds were introduced to supply the demand for heavy draft animals. These breeds have continued to be considered the most desirable.

There are only three commercial dairy farms in the county, but many of the farmers sell their surplus cream and butter. Most of the dairy products are sent to Spokane, Wash.

In the preparation of the land for planting the ground usually is broken with heavy moldboard plows. In growing grain the following rotation is practiced by many farmers: First year, wheat; second year, wheat or other small grain; third year, fallow. A rotation recommended by the experiment station consists of wheat the first year, wheat or other small grain the second year, and peas or other cultivated crop the third year.

Very few of the farmers use manure, fertilizers or green-manure crops. Many of them burn the stubble after the wheat is harvested. Practically all the straw stacks are burned. When a heading machine or combined header and thrasher is used in harvesting, most of the straw remains on the field. (See Pl. II.) Plowing this straw under is a much better practice than burning it.



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FIG. 1.—NARROW CANYONLIKE VALLEY OF POTLATCH RIVER, AT KENDRICK
Uplands and benches covered with soils of the Palouse series; floor of valley covered with
soils of the Yakima series.



FIG. 2.—TYPICAL FARMSTEAD AND BUILDINGS ON PALOUSE SILT LOAM.

HARVESTING WHEAT WITH COMBINED HEADER AND THRASHER ON SOILS OF THE P





FIG. 1.—CHARACTERISTIC TOPOGRAPHY AND DIVERSITY OF CROPS ON PALOUSE SILT LOAM IN CERTAIN LOCALITIES.

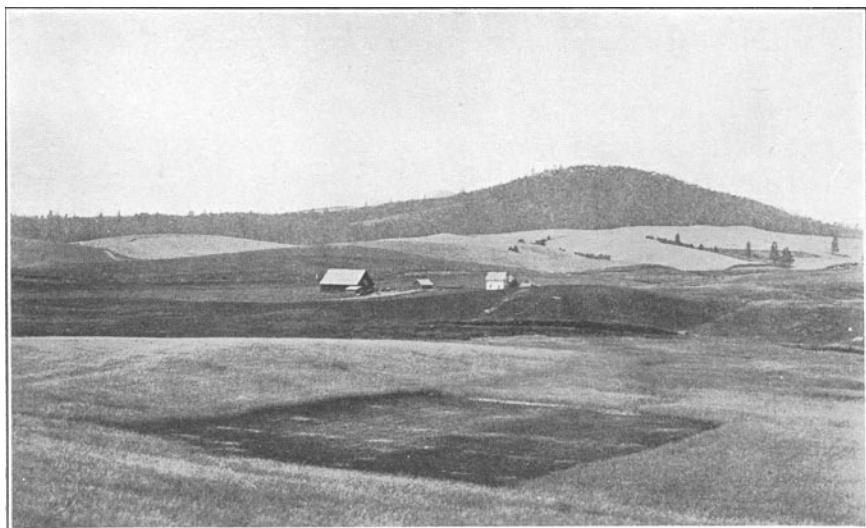


FIG. 2.—TYPICAL TOPOGRAPHY OF PALOUSE SILT LOAM, NEAR JOEL.

Timbered ridge in distance covered with soils of Moscow series.

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Little farm labor outside of harvest help is employed by Latah County farmers, most of the ordinary work being done by the farmer and his family.

The average size of farms in Latah County, according to the 1910 census, is 174.5 acres. The census reports 47.2 per cent of the area of the county in farms, these numbering 1,951. Eighty-three per cent of the farms are operated by owners and about 17 per cent by tenants.

SOILS.

The soils of Latah County may be broadly divided into three groups—residual, eolian, and alluvial.

The residual soils are those that have been derived directly from the weathering in place of the underlying rocks. Basalt, granites, quartzites, schists, and gneisses have in this county weathered into light-colored soils, such as are found on most of the buttes and mountains.

The soils of the second group are derived from finely divided material, probably of wind-borne origin. The deposits extend over a wide area of country and form a mantle covering the basalt plain and the lower lying granite buttes. This deposit is the cause of the rounded profiles which characterize the topography of the county.

The alluvial soils represent recent alluvium brought down by the streams and deposited in the valleylike depressions and along their courses. This alluvium is derived from a wide range of rocks and minerals and consists of reworked eolian and residual material.

In the classification of soils adopted by the Bureau of Soils the soil type is the unit of classification and mapping. This includes all occurrences of soil of identical or very similar characteristics in color, texture, structure, depth of subsoil or substratum, origin, and mode of formation. Minor variations or local departures from these typical characteristics that are not of sufficient importance or extent to warrant recognition as distinct soil types are recognized as phases. The soil series consists of a number of closely related soil types differing essentially only in texture, which is determined by the relative degree of coarseness or fineness of the component material. A soil series, therefore, consists of a number of soil types of common origin and mode of formation, similar in color, character of subsoil, etc., and ranging in texture from coarse sand to clay.

Excluding Rough mountainous land and Rough stony land, seven soil types, with three phases, are recognized in Latah County. Two of these are residual, two are derived from eolian, or loessial, material, and three consist of recent-alluvial deposits. The eolian and the residual soils are the most important.

The residual soils are classed in one series—the Moscow. The surface soils of the Moscow are of light-brown to brown color, with light

grayish brown to yellowish-brown variations. They overlie subsoils of grayish yellow or yellowish-brown to pale-yellow color. The deeper subsoil frequently consists largely of disintegrated rock and grades into a substratum of bedrock. The soils of this series are residual from the weathering of granites, schists, gneisses or quartzites, though influenced in some localities by admixtures of the fine-grained loessial or wind-laid material. These soils are developed on the buttes and mountains. Rock outcrop is abundant, and the soils are in many places too shallow to cultivate. Most of the areas mapped in this series are forested. The series is represented in this county by two members—the Moscow sandy loam and Moscow loam. As mapped the boundary between these two soil types and adjacent loessial soils is frequently arbitrarily placed, and each series may include locally some areas of the other.

The eolian, or loessial, soils are included under two series—the Palouse, which consists of dark-brown to black soils of the prairie, and the Helmer, which consists of light-colored, forested soils.

The soils of the Palouse series are of dull-brown or dark-brown to black color, the brown tint being most pronounced in air-dry samples or under dry field conditions. The surface soil is usually high in organic matter and is almost black when wet. The subsoils are ordinarily heavier in texture and more compact in structure than the surface soils, but in places they are of practically the same texture. The upper subsoils are of brown or light-brown color, the deeper subsoils being yellowish brown. The Palouse soils are developed in the hilly, treeless prairie country of southeastern Washington and over the western part of Idaho. They are derived from wind-laid material, which forms a mantle over the Columbia River basalt and the lower lying granite hills.

The Palouse soils are differentiated from soils of similar origin developed in the less humid sections of Washington and Idaho in that the material is noncalcareous and of darker color. In Latah County the Palouse series includes one type—the silt loam—with a terrace phase and a landslide phase.

The soils of the Helmer series are pale yellow to yellow in color, with light grayish yellow to brownish-yellow variations. The upper subsoils are usually of slightly lighter yellow to grayish-yellow color; the deeper subsoils are similar or slightly darker in color and usually are compact, the structure in places approaching a hardpan in densely forested areas. The surface material under dry field conditions sometimes assumes a light-grayish or bleached appearance, this being most noticeable upon slopes, where the grayish compact subsoil has been exposed. The Helmer soils are low in organic matter. They are derived from eolian deposits and the soil and subsoil material is noncalcareous. The topography is gently rolling to undulating

and drainage is well developed. The series is differentiated from the Palouse series in its lighter color of soil and subsoil. The areas are, or have been until recently, covered with timber and much of the series is still in forest. In Latah County the Helmer silt loam, with a terrace phase, is recognized.

The alluvial soils are included under three series—the Caldwell, Potlatch, and Yakima. The Caldwell has dark surface soils and fair to good drainage; the Potlatch has brown to dark-brown surface soils, with mottled gray and yellow subsoils and poor drainage; and the Yakima series has light-brown to dark-brown soils, carrying basaltic cobblestones and a substratum of basaltic boulders.

The following table gives the name and the relative and actual extent of each type mapped in the county:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Palouse silt loam.....	193,984		Moscow loam.....	37,184	6.4
Terrace phase.....	1,664	33.7	Caldwell silt loam.....	15,424	2.6
Landslide phase.....	578		Potlatch silty clay loam.....	9,472	1.6
Helmer silt loam.....	148,544		Moscow sandy loam.....	2,304	.4
Terrace phase.....	832	25.7	Yakima loam.....	576	.1
Rough mountainous land.....	130,816	22.5	Total	582,400
Rough stony land.....	41,024	7.0			

MOSCOW SANDY LOAM.

The soil of the Moscow sandy loam is a light-brown or light grayish brown to light yellowish brown sandy loam, often of rather light texture, extending to a depth of 8 to 12 inches, and underlain by a grayish-yellow to light yellowish brown sandy loam. The substratum material of decomposing granite, gneiss or mica schist from which the material is derived, is usually encountered at about 36 inches. In places the soil is much shallower and outcrops of exfoliated granitic rocks are numerous throughout the type. The residual material is often mixed with or covered by wind-laid deposits.

The type occurs in the western part of the county on the high buttes and on mountain footslopes, at elevations ranging from 400 to 1,000 feet higher than that of the adjacent areas of the Palouse silt loam. Drainage is excessive and the soil is somewhat subject to erosion. Owing to this liability and to its more open structure, lower content of organic matter, and deficient water-holding capacity, it is not considered as desirable as the other soils of the county. Most of the areas mapped as the Moscow sandy loam remain in forest. The timber growth consists of yellow and lodgepole pine, with a small proportion of spruce and fir. Ferns grow rank on this soil.

The Moscow sandy loam is of little importance in the county, owing to its limited area and its low agricultural value. It is utilized mainly for grazing and to a minor extent for the production of grain.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of this type:

Mechanical analyses of Moscow sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
540504.....	Soil.....	12.2	12.6	5.6	22.8	18.0	24.6	4.2
540505.....	Subsoil.....	20.5	18.0	5.5	16.2	10.0	23.6	6.3

MOSCOW LOAM.

The soil of the Moscow loam to a depth of about 10 inches is a yellowish-brown to light grayish brown or light-brown loam, of somewhat silty texture and friable structure. It contains small quantities of quartz and mica. The subsoil usually extends to a depth of 3 to 5 feet and consists of a light-yellowish to grayish or yellowish-brown loam. The subsoil where the parent rock has completely weathered is often a stiff, plastic clay. In some of these places this clay is bright red in color, but the usual color is grayish or yellowish brown. The decomposing bedrock (usually granite, in places quartzite or schist) is usually encountered within the 6-foot section.

The surface soil of the Moscow loam is influenced in character by fine loessial or wind-laid material, and the gradation between the wind-laid soils and the Moscow loam in places is so gradual that arbitrary boundaries of separation had to be drawn.

The Moscow loam occupies the footslopes of the Thatuna Range and occurs on the slopes and the tops of granite buttes throughout the county. The topography ranges from gently sloping to steep. Drainage is usually excessive and the soil somewhat subject to erosion. Outcrops of granite, quartzite, and mica schist are numerous. Rock-outcrop symbols on the soil map indicate some of the areas containing large exposures of the parent rock.

The original timber growth on the Moscow loam consisted of yellow and lodgepole pine, tamarack, spruce, and cedar.

Much of the type is cleared and under cultivation to wheat, oats, and timothy. The yields are fair to good but not as large as those of the Palouse silt loam. Prunes, cherries, and apples do fairly well. Owing to the shortness of the season, however, apples do not properly mature, and growing them on a commercial basis has never proved a success.

PALOUSE SILT LOAM.

The soil of the Palouse silt loam to a depth of 8 to 14 inches is a dull-brown or dark-brown silt loam, underlain to a depth of 36 to 40 inches by a brownish-yellow to brown or light-brown silt loam or silty clay loam, which usually grades into a silty clay or silty clay loam in the lower subsoil. The lower subsoil is usually yellowish brown or brownish yellow, lighter in color than the intermediate material, and rests upon a tawny-yellow substratum of homogeneous and unstratified loessial deposits of fine texture, from which the soil material is derived. This rests upon underlying bedrock at depths ranging from a few feet to 50 feet or more.

The surface soil is high in organic-matter and when wet is nearly black in color. The brown tint is most pronounced under dry field conditions.

In places there is very little difference between the texture of the soil and that of the subsoil. This condition is typical of the lighter phases of the type. The subsoil is usually compact, but the structure of both surface soil and subsoil permits the ready absorption of rainwater and there is little washing, even on the steepest hills.

The only noticeable variation in the type that is associated with difference in position of occurrence, and that affects the productivity of the soil, lies in the brown to yellowish-brown spots developed on the prominent points of the hills. These spots are due to exposures of the subsoil material, believed to be caused by continuous downhill plowing. These patches of soil are deficient in organic matter, appear to be less retentive of moisture, and are consequently less productive than the typical soil. They may occur at any position on the hills. The larger of these spots comprise as much as an acre, but they are usually very small.

The Palouse silt loam occupies the rolling-prairie part of the county, which is usually referred to as the Palouse wheat country. The hills are gently sloping to steep, but are smooth enough to allow the use of the combined harvester and other modern farm machinery. (See Pl. I, figs. 1 and 2; Pl. II; and Pl. III, figs. 1 and 2.)

The topography is flatter in the western part of the county, in what is called the Farmington district. There is little difference in the soil from the typical Palouse silt loam, except for the very gently rolling surface and possibly slightly higher content of organic matter in the surface soil.

The virgin soil supported a rank growth of bunch grass, with a scattered brushy growth consisting of wild roses, snowberries, and buckbrush, which spread as the grass was more closely grazed. All the type is now under cultivation.

Wheat, oats, barley, timothy, and navy beans are the principal crops grown on the Palouse silt loam. Wheat predominates, with yields averaging over 35 bushels per acre. Many of the fields of this soil have been in cultivation to wheat for a period of over 40 years, with little apparent lowering of the productiveness. Yields of oats range from 30 to 80 bushels per acre, and of timothy from 1 to 3 tons of hay. Only a small area is devoted to bean growing, comprising fields on the ridges north of Juliaetta and Kendrick extending north toward Troy. The yield of beans varies from 800 to 1,000 pounds per acre. Large yields of barley are obtained from this type of soil, but the acreage in this grain is small.

Irish potatoes do well on this soil, but owing to uncertain market conditions they are not grown commercially. With a proper growers' organization and systematized marketing it is possible that potatoes would be a very profitable crop. Alfalfa is grown in small patches. The yields are light, as seldom more than one cutting is obtained each year.

Hardy fruits and berries do well, but apples are not as highly colored as they are in the irrigated sections of the State.

The prices of land of the Palouse silt loam vary according to the nearness to markets and the improvements. Prices range from \$40 to \$150 an acre.

Palouse silt loam, terrace phase.—The soil of the terrace phase of the Palouse silt loam is very much like that of the typical soil. The topography, however, is level and the soil occupies terraces along the streams that flow through areas of typical Palouse silt loam. There appears to be a more nearly uniform depth of the dark surface material than in the typical soil, and the subsoil is in places somewhat heavier. The soil turns black on becoming wet, probably on account of the high content of organic matter. In places a substratum of fine gravel is encountered. This, however, is of local occurrence and is found only under small areas.

This soil appears to represent old stream terraces which have been veneered with loessial deposits. The areas usually lie 15 to 30 feet above the adjacent recent-alluvial soils of the stream valleys.

The terrace phase of the Palouse silt loam is a desirable soil for the common crops grown in the region, and all the land is under cultivation. The phase is well suited to Irish potatoes and wheat, and alfalfa can be grown. Oats give large yields. The terrace phase is easier to cultivate than the typical soil, owing to its level to very gently sloping topography.

The prices of land of the Palouse silt loam, terrace phase, range from \$50 to \$150 an acre.

Palouse silt loam, landslide phase.—The soil of the landslide phase of the Palouse silt loam is a brown to grayish-brown, friable silt loam

to a depth of 10 to 15 inches. This grades into a yellowish-brown to light-brown silt loam to silty clay. The soil of this phase is of eolian or loessial origin and is very much like that of the typical Palouse silt loam, except that it is of somewhat browner color. The phase occupies benches in the canyons of Potlatch River, lying 500 to 1,000 feet or more below the typical upland Palouse silt loam.

Owing to the more favorable local climatic conditions, the phase is suited to the growing of early vegetables, fruits, cantaloupes, and berries. Corn and field beans do better than on the typical soil, owing also to the protected position in the canyon and the longer growing season.

In the following table the results of mechanical analyses of samples of the soil, subsoil, and lower subsoil of the Palouse silt loam, landslide phase, are given:

Mechanical analyses of Palouse silt loam, landslide phase.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
540523.....	Soil.....	0.4	1.2	1.3	7.2	30.9	51.1	7.9
540524.....	Subsoil.....	.2	1.6	1.6	8.6	36.0	46.8	5.5
540525.....	Lower subsoil.	1.0	3.2	3.4	15.4	36.7	36.3	4.2

HELMER SILT LOAM.

The soil of the Helmer silt loam to a depth of 6 to 10 inches is a light grayish yellow or brownish-yellow to pale-yellow silt loam, underlain to a depth of 24 to 30 inches by a noncalcareous, pale-yellow to yellowish-gray, powdery silt loam. This passes below into a yellowish-gray to drab, compact silt loam to silty clay loam, which usually extends to a depth of 36 to 50 inches. In places the silt content appears to be rather low and the material is gritty. The soil here more closely resembles a loam in texture.

In the heavily forested areas of this type a compact, hardpanlike material is encountered at a depth ranging from 36 to 60 inches. This has a thickness usually of 4 to 10 inches.

Included in the areas of Helmer silt loam are small spots of gray-colored soil, evidently due to exposure of the grayish subsoil material.

The Helmer silt loam is of eolian origin and is underlain by pale-yellow to yellow, fine-grained deposits of loessial material. It occupies gently rolling hills in the eastern, central, and northern parts of the survey. Drainage is well developed, but there is practically no erosion at the present time.

Only a small proportion of the type has been brought under cultivation, the greater part of it being still in virgin timber, consisting of yellow, white, and lodgepole pine, and fir, spruce, tamarack, and cedar. In some of the forested areas the timber growth is almost entirely white pine.

The cut-over land of this type gives fair yields of the small grains and produces excellent timothy. The soil tends to puddle and become compact when first cultivated, and it usually requires 2 or 3 years to work up a mellow, friable tilth.

The prices of the logged-off lands of this type range from \$1 to \$15 an acre. The general surface condition, the size of the stumps, and the accessibility usually determine the price. The lands which are in part cleared sell for \$10 to \$25 an acre, and those cleared and under cultivation sell at prices ranging from \$25 to \$80 an acre.

Helmer silt loam, terrace phase.—The terrace phase of the Helmer silt loam differs from the typical soil only in its topographic position and in having in places a substratum of gravel. The soil to a depth of 8 to 12 inches is a light grayish yellow to pale-yellow or brownish-yellow silt loam, underlain to a depth of about 60 inches by a grayish-yellow or brownish-yellow, compact silt loam, which is underlain in many places by a substratum of sand or gravel.

The soil is of eolian origin and occupies old terraces along Potlatch River and its tributaries in the vicinity of Bovill. The terraces stand at an elevation of 10 to 50 feet above the adjacent overflow bottoms occupied by the recent-alluvial soils.

Much of this phase is densely forested with white pine, cedar, fir, and spruce. The areas that have been cleared and put in cultivation give good yields of oats.

Mechanical analyses of samples of the soil, subsoil, lower subsoil, and substratum of the typical Helmer silt loam are given in the following table:

Mechanical analyses of Helmer silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
540526.....	Soil.....	1.2	2.3	1.0	4.3	16.0	68.9	8.8
540527.....	Subsoil.....	.6	1.8	1.0	4.2	15.1	67.3	10.0
540528.....	Lower subsoil.	1.2	1.6	.9	4.0	16.0	65.9	10.7
540529.....	Substratum.	.3	1.6	1.0	4.0	14.9	64.8	13.6

CALDWELL SILT LOAM.

The soil of the Caldwell silt loam to a depth of 10 to 15 inches is a dark-gray to drab silt loam, which becomes black when wet, but which when dry usually has a more or less pronounced brownish

tint. This is underlain to a depth of 36 to 40 inches by a grayish-yellow to grayish or dark-gray to drab silt loam to silty clay loam, which in turn is underlain by a dark-gray, heavy silt loam. The subsoil is usually compact and frequently mottled, and locally may be feebly calcareous.

A substratum of gravel or gravelly sand is encountered in some areas, but this seems to be local and is not typical in general of the Caldwell silt loam.

The type consists of recent-alluvial deposits originating from a variety of rocks. It occupies first bottoms along the streams in the western part of the county, but is ordinarily above overflow. Natural drainage is fairly well established and crops are grown without artificial drainage, but the type is slower in warming up in the spring than are the upland soils. The drainage ways through the type are ill defined in places, there being no regular channel. Here the bottoms are water-soaked during the winter months, and spring plowing and seeding are often delayed.

Where drainage is well established the type is highly prized for the small grains and hay grasses. Wheat, oats, timothy, clover, alfalfa, and Irish potatoes do well. Much of the type is used at present for growing grasses for hay and pasturage. A mixture of timothy and alsike gives large yields of hay.

POTLATCH SILTY CLAY LOAM.

The soil of the Potlatch silty clay loam to a depth of 8 to 12 inches is a light-brown to dark-brown silty clay loam, usually friable. This is underlain to a depth of 30 to 36 inches by a light brownish gray to gray or yellowish-gray silt loam to silty clay loam, resting upon a deeper subsoil of light-gray or grayish-yellow color, frequently mottled with brown, gray, and yellow. The subsoil is usually compact. There is a small proportion of mica and quartz grains in both surface soil and subsoil.

The type is of recent-alluvial origin, derived from a wide range of rocks and minerals. It occupies first bottoms along streams or occurs as local flats that have no definite stream channels. The type is in a poorly drained condition and is in part subject to overflow. Its present utilization is mainly for growing tame grasses and the cutting of wild grasses for hay. A small proportion of the land is devoted to oats.

Before the county was settled there was a rank growth of wild grasses on all the flats included in this type and they have been used for hay to the present time. The wild grasses are gradually being displaced by timothy, alsike, brome grass, and other tame grasses.

The type is best suited in its present condition to be used as hay and pasture land.

YAKIMA LOAM.

The Yakima loam, owing to its small extent, is indicated on the map by inclusion symbol in the color used for the Potlatch silty clay loam. The soil of the Yakima loam to a depth of 6 to 10 inches is a light-brown to dark-brown loam, in places of silty texture, underlain by a brown or light yellowish brown loam to a depth of about 40 inches. Basalt cobbles, varying in size from pebbles to stones 15 inches in diameter, occur throughout the surface soil and subsoil; the substratum consists of bowlders intermixed with fine gravel and small proportions of sands and silt.

The surface is rather hummocky and in places the bowlders on the surface are too thick to permit cultivation.

The type consists of recent-alluvial deposits and occupies first-bottoms along Potlatch River and its tributaries. It is typically developed in the vicinity of Kendrick. The Yakima loam is in part subject to overflows during flood periods, but these seldom occur at such a time of the year as to damage crops or to interfere with the bearing of small fruits. Its low elevation and protected position in the canyon (See Pl. I, fig. 1) make it well suited to growing early vegetables and small fruits.

The type is small in extent and of minor importance in the agriculture of the county.

ROUGH MOUNTAINOUS LAND.

The classification of Rough mountainous land includes the rougher areas of the mountains and buttes throughout the county and comprises also small, undifferentiated areas of Moscow sandy loam and loam too steep for cultivation. The soils are mainly of residual material from granite, quartzite, and schist, with the exception of those on Potato Hill, which consist of slightly decomposed basaltic breccia and which are barren of timber. Wind-laid or loessial material forms a thin mantle over most of the mountains, but this is too shallow in most places to form a cultivable soil. The included residual soils resemble in character those of the Moscow series, and the included wind-laid soils are similar to those of the Helmer series.

The topography is generally rough. The soils are often stony and contain outcrops or protruding masses of underlying bedrock.

Most of the Rough mountainous land is in virgin or second-growth forest. Large areas support a heavy growth of white pine, cedar, and tamarack. Ferns grow throughout the timbered areas.

Rough mountainous land affords good grazing for sheep and cattle. It is best adapted to remain in timber for use as grazing land.

ROUGH STONY LAND.

The Rough stony land classification includes all the areas too steep for cultivation, in the vicinity of the streams which have devel-

oped steep-walled canyons in the southern part of the county. The soils are mainly residual from basalt, but are influenced by wind-laid material, and areas of wind-laid soils, too small to separate on a map of the scale used, are included.

The soil is shallow, basalt outcrops are frequent, and the slopes are steep, making the land unsuited to cultivation.

In the Potlatch River canyon southwest of Bovill the slopes are forested, but most of them are barren of timber and support only a scant growth of brush and bunch grass. The rough stony land affords fair grazing during the spring.

SUMMARY.

Latah County is located in the west-central part of northern Idaho, in what is commonly known as the "Panhandle." The area surveyed contains 910 square miles, or 582,400 acres, and does not include that part of the county in the St. Joe National Forest.

The western and southern parts of the county are rolling prairie, while the extreme eastern and northern parts are mountainous in character. The south-central part has been dissected by swift-flowing streams, which have cut deep canyons through the underlying basalt. The general elevation of the county is about 3,000 feet above sea level; the hills are from 500 to 2,000 feet higher.

Drainage is well established over the whole county. The eastern part has swift-flowing streams, while the streams in the western part are more sluggish and have bottom lands along their courses.

The population of the county according to the 1910 census is 18,818. Moscow, the county seat, has a population of about 4,000. Potlatch, Genesee, and Troy are locally important towns.

Most parts of the county are supplied with railroad facilities. Several steam and electric railroads have lines through or to different points in the county.

Latah County is very prosperous. The farmhouses and buildings are in good condition and the farm machinery is modern.

Wheat, oats, barley, and timothy are the leading crops grown in the county. Few of the farmers practice systematic crop rotations, most of them growing wheat year after year.

Land values range from \$25 to \$150 an acre for improved land, while some of the stump lands sell for prices ranging from as low as 50 cents an acre up to \$12 to \$15 an acre.

The weather in Latah County during most of the year is pleasant. The winters, however, are moderately cold, snow often lying on the ground for six weeks. The growing season is long enough to mature most general farm crops.

The soils of the county are in the main residual or loessial (eolian) in origin. Some alluvial soils are mapped in local flats and along the stream courses.

The residual soils are represented by the Moscow series, of which two types are mapped, the sandy loam and loam. These soils are derived from the weathering in place of granite, gneiss, and schists. The surface soils are light brown, with subsoils of grayish yellow to yellowish brown. Unweathered rock material is often encountered in the soil section.

The eolian, or loessial, soils of the county are represented by the Palouse and Helmer series, one type and two phases of the Palouse and one type and one phase of the Helmer being mapped.

The Palouse silt loam has a dull-brown to black surface soil, underlain by yellowish-brown silt loam and silty clay loam. Wheat and oats are the chief crops grown. The terrace phase of this type is quite similar to the typical soil except for its occurrence on terraces along the stream valleys. The landslide phase is also similar to the typical soil. It occurs on landslide benches in the canyons and owing to the lower elevations and better air drainage matures crops that do not mature on the typical, more elevated soil on account of the earlier and more frequent frosts.

The Helmer silt loam is a pale-yellow to grayish-yellow soil of the forested loessial areas. It has a low organic-matter content and is less productive than the Palouse silt loam. The terrace phase of the Helmer silt loam occupies terraces along Potlatch River and its tributaries. It is very much like the typical soil, except in position of occurrence.

The alluvial soils are represented by three series, one type being mapped under each, viz, the Caldwell silt loam, Potlatch silty clay loam, and the Yakima loam.

The Caldwell silt loam occupies the better drained bottoms subject to occasional overflow. It is of dark-gray or drab to black color.

The Potlatch silty clay loam is a poorly drained soil, occupying the first bottoms along streams. The surface soil is a brown to dark-brown silty clay loam, underlain by a gray to mottled gray and yellow subsoil. It is utilized mainly as pasture and hay land.

The Yakima loam is an unimportant soil developed along Potlatch Creek and its tributaries. It is well suited to early vegetables and fruits.

Rough mountainous land includes areas of the higher hills and mountains too rough for cultivation.

Rough stony land includes the steep and rolling slopes along stream courses in the southern part of the county. The land is not suitable for cultivation.



[PUBLIC RESOLUTION—No. 9.]

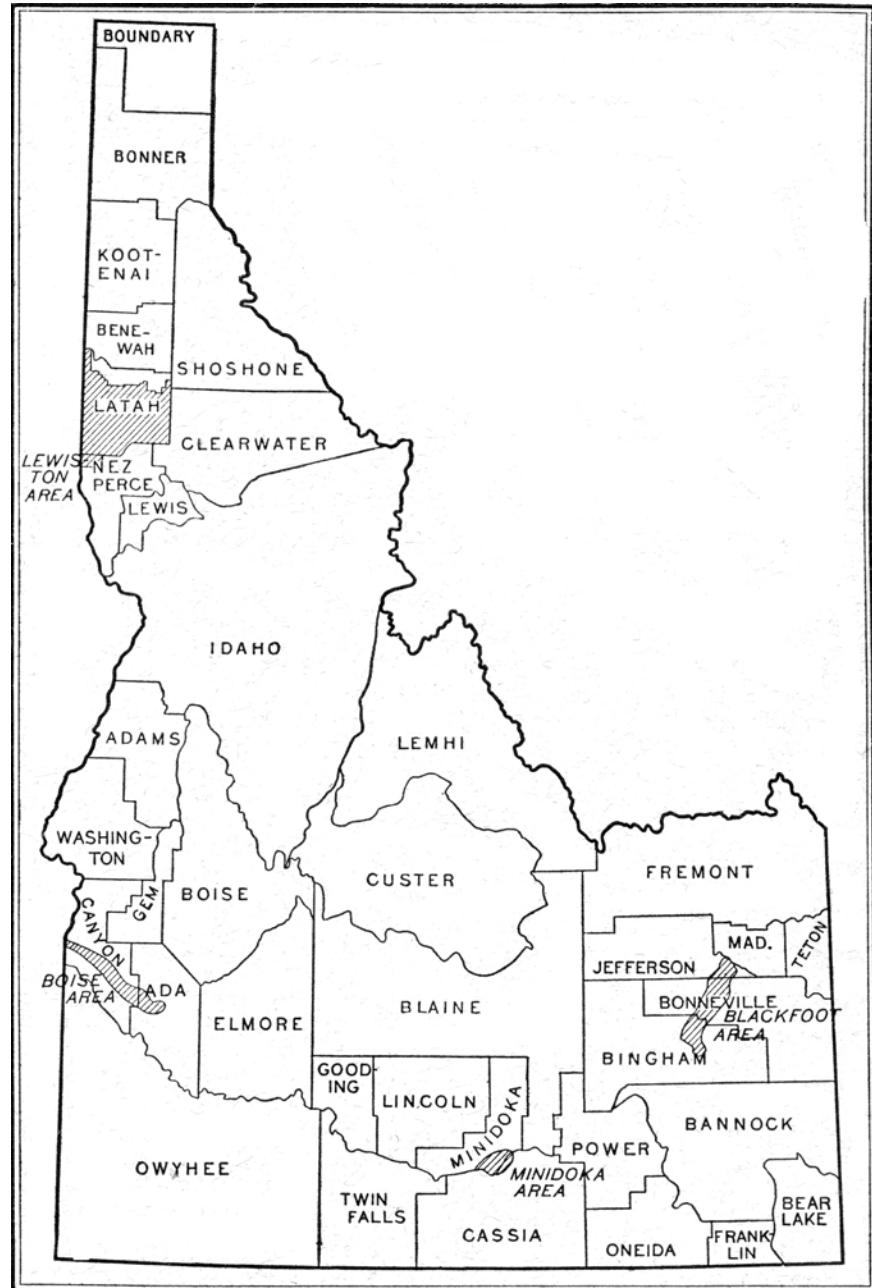
JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided*, That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture.

Approved, March 14, 1904.

On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils.



Areas surveyed in Idaho.

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